

Commonwealth of Kentucky
Division for Air Quality
PERMIT STATEMENT OF BASIS

TITLE V (DRAFT PERMIT) No. V-03-004 R2

DARAMIC, LLC

5525 U.S. 60 EAST, OWENSBORO, KY 42303

MAY 12, 2006

IL-WON SHIN, REVIEWER

SOURCE I.D. #:	021-059-00006
SOURCE A.I. #:	894
ACTIVITY #:	APE20060002 AND APE20050003

SOURCE DESCRIPTION:

Daramic, LLC located at Owensboro, Kentucky, manufactures polyethylene battery separators through five main processes: receiving and handling of bulk materials, mixing of bulk materials, extrusion of the mixture, extraction of oil from the polyethylene web, and finishing by application of fiberglass mat to the polyethylene web and/or slitting/chopping.

Bulk materials are received by railcar, bags, and by drums. Dry materials received by railcar are pneumatically conveyed from the railcar into three main storage silos, one for polyethylene and two for silica. The railcar unloader uses an induced draft fan to move the product from the railcar into a cyclone and baghouse unit to recover the product. These materials are then pneumatically conveyed into the storage silos. Silo 1 is equipped with a baghouse to prevent product from escaping. Silo 2 & 3 share a baghouse.

The bulk polyethylene and silica is then conveyed from the storage silos up to the 5th floor penthouse into process hoppers. The contents of the process hoppers then are gravity fed into a weigh hopper where the mixture is controlled. The minor ingredients, including the carbon black pellets, the antioxidant, and the wetting agents are added at this point from either bags or drums. Out of specification products are introduced at this point.

From the weigh hoppers, the materials are transferred into the mixers. The mixers blend the solid ingredients, oil, and, where applicable, surfactant. Once the oil has been added to the blend, the potential for particulate emissions is eliminated. The blend is then transferred to a storage bin where it is fed to extruders Number 2 through 6.

Once the feedstock is fed into the extruders, they are heated, more oil is added, and the material is forced through a die to produce the thin, wide sheet of polyethylene web. During the extrusion process, a small amount of oil smoke is released from the heated die, and is captured and treated through Smog-Hog brand electrostatic precipitators. The condensed oil is collected and recycled back into the process. The polyethylene web is rolled onto cores and the roll of polyethylene web is transferred to the extractors via forklift.

The polyethylene web is then loaded into the extractors. The solvent used to extract the oil from the web is a blend of solvents in which the primary ingredient is hexane. The extractors use a counter flow bath of solvent, which removes the oil from the polyethylene web to provide the needed porosity. The extractor is serviced by numerous tanks to supply fresh solvent and to collect and recycle used solvent and oil.

The vapor emissions from the four extractors, three evaporators, and all solvent storage tanks are 100% Volatile Organic Compounds (VOCs) and contain only one Hazardous Air Pollutant (HAP), hexane. These vapor emissions are collected by any one of three carbon bed systems. Carbon Bed #1 controls the emissions from Extractors #1 and #2, Evaporator #1, and tanks associated with those two lines as well as tanks located at the Old Tank Farm. Carbon Bed #2 controls the emissions from Extractor #3, Evaporator #2, and tanks associated with that line as well as tanks from the New Tank Farm. Carbon Bed #3 collects the emissions from Extractor #4, Evaporator #3, and tanks associated with that line.

As the carbon bed units are steamed to regenerate the carbon, the solvent in the steam is recovered in the Evaporator, where it is then transferred back to the process tanks for reuse.

The polyethylene web is then coated with a surfactant, dried in a steam oven, and then transferred to finishing to be slit or chopped and readied for shipment. The final product is shipped to customers via their specifications.

Daramic uses three boilers to provide both space heat and process heat. Two small boilers (22.3 and 26.8 mmBtu/hr respectively) are used to provide space heat during the 5 cold months of the year. The main boiler (63 mmBtu/hr) is used to provide process heat for Daramic and Owensboro Specialty Polymers (previously WR Grace). All boilers are natural gas fired with the capability of burning number 2 fuel oil as a backup. Operation of these boilers on #2 Fuel Oil is used as a last resort in maintaining production operations.

Recently Daramic purchased the Fibermark, Inc. facility located at the same physical location. This purchase included the Cleaver Brooks 900 hp Boiler. This boiler was previously permitted by Fibermark and operated under Permit # S-99-115. Daramic submitted a construction application for permitting of a 900 hp Boiler and addition of insignificant activities on May 11, 2006.

The boiler has been designated (01)(77)(223) Boiler #4 – Cleaver Brooks 900 hp (37.8 mmBtu/hr). The secondary fuel tank has been designated (11)(78)(224) T-507 Fuel Oil #2 – Boiler Backup. Potential emissions from Boiler #4 are below the prevention of significant deterioration of air quality (PSD) significant increase levels, defined in 401 KAR 51:001.

COMMENTS:

1. Permit background:

The Daramic operation in Owensboro originally started under the W.R. Grace Co. in 1969. The first permit issued by the Division for Air Quality (Division) was for extractor lines one and two. Over the next 36-years, the operation added two additional extractor lines, modified several processes as the facility expanded and technology changed, and changed ownership from W.R. Grace to Daramic, Inc. and currently Daramic, LLC.

Permit C-90-109 (Revision-3) issued on May 4, 1995, contained conditions for the new Extractor Line III that required a plant-wide hexane emission limit of 121 lb/hr, and the solvent (content 87% n-hexane and the remainder other VOCs) usage limit for Extractor Lines I and III combined of 118,000 gallons per year.

Title V permit application was submitted to the Division on December 11, 1996. Following the reviews of the permit application in July 2002, the Division issued a Notice of Violation to the facility for alleged excess of the 118,000 gallons per year limit. The facility signed an Agreed Order with the Division in December 2003 that required the facility to prepare and submit a prevention of significant deterioration permit application for Extractor Line III.

Title V permit application dated December 1996 resulted in a draft Title V permit, which was presented for public notice (published on December 10, 2003, in the *Messenger-Inquirer* in Owensboro, Kentucky). Daramic submitted comments on the draft Title V during the public comment period, and informed the Division that the facility had not addressed all of the existing emission units in the permit application. Due to these comments, the Division requested that Daramic prepare a supplemental Title V permit application. The original permit (V-03-004) was issued on April 1, 2004. The revised Title V permit application and the PSD information for Extractor Line III was submitted in August 2004. The modification permit (V-03-004 R1) was issued on July 5, 2005.

THE CHRONOLOGICAL PERMIT BACKGROUND IS TABULATED IN THE FOLLOWING:

Permit #	Issuance Date	Summary of Action
		Extractor Line I installed 1969 Extractor Line II installed April 1969 Carbon Bed #1 for Extractors I & II installed April 1972
O-73-144	June 7, 1973	Permit issued to W.R. Grace & Co. for production of paper base resin battery plate insulators with average 3,000 lb/day hexane (547.5 TPY) emission.
O-79-286	June 27, 1979	Company's letter of February 2, 1983 informs that the plant is separated into four sections: 1- Paper battery insulator 2- Plastic battery insulator 3- Paper Mill 4- Organic Chemicals manufacturing VOC emissions average 270.4 Tons/Year
O-84-072	June 22, 1984	Permit issued for Paper Mill consisting of three Curing Ovens, one Phenolic Resin Impregnator Oven, Extractor & Festoon Oven, and four Boilers (capacities of 22.3, 26.8, 63, and 1.1 mmBtu/hr burning Natural gas and No. 2 fuel oil as backup).
C-86-020	February 2, 1986 May 18, 1987	Gas fired incinerator and plastic extruder were installed. Production line speed was increased from 37,500 pieces/hr to 66,666 pieces/hr.

C-88-021	February 10, 1998	Replacement of Chopper to increase production of the existing battery separator Line, with VOC emission increase less than 40 TPY. Formaldehyde emission from the incinerator shall not exceed 1.12 lbs/hr and 4.03 tons/yr.
C-89-084	May 30, 1989	Conveying of Polyethylene shall not exceed 2,096.64 TPY, Silica 4,542.72 T/Y, heavy Oil 10,483.2 T/y, anti-Oxidant 87.36 T/Y, Wetting agent 87.36 T/y.
C-90-109 dated 7/10/1990 later was revised as Revision- 1 in 9/14/1990	September 14, 1990	Extractor Line III with Evaporator, Drying Tunnel, and Drying Oven are added to the existing Extractor Line I mainly under the following conditions: 1- Make process improvement to Extraction Line I to reduce fugitive VOC emissions such that the net emissions from the construction shall not exceed 39.9 T/Y. 2- The minimum process improvement efficiency (reduction in VOC emission) for Line I shall be at least 22%. 3- Plantwide n-hexane emissions shall not exceed 104.5 lb/hr.
C-90-109 Revision-2	June 17, 1994	Web extraction of Line 3 is increased from 2,000 lb/hr to 2,538 lb/hr with the same above conditions 1 & 2, and 104.5 lb/hr plantwide of n-Hexane emissions.
C-90-109 Revision-3	May 4, 1995	Production rates of Extraction Lines 1 & 3 are deleted from the permit, instead, based on submitted dispersion modeling for n-Hexane, a plantwide emission of 121 lb/hr is set, and the maximum usage of solvent (content 87% n-Hexane and other VOCs) for Lines I & III is set to be 118,000 gallons per year.
C-91-052	May 7, 1991	Construction of Conveying materials and two extruders.
S-95-019	February 27, 1995	Amended application of December 5, 1994 reflect a change in ownership and name to Daramic, Incorporated. Extractor Line IV Construction with n-Hexane emissions limit of 24.46 lb/hr for Drying Oven, LEL Oven, Coater Dryer, Web rewinder, and Tanks with Carbon Bed for emission control device, under the plantwide emission of 121 lb/hr for n-Hexane. Memorandum dated December 5, 1994 indicates Construction of Extractor Line 4 has netted out of the PSD review for VOC.
S-95-080	May 2, 1995	Addition of a WP6 Mixer and WP6 Extruder.
V-03-004	April 1, 2004	Division issued a Notice of Violation, and request prevention of significant deterioration permit application for Extractor Line III.
V-03-004 R1	July 5, 2005	The major revision of the battery plate insulator plastic web production plant
V-03-004 R2		The Mix Tower Dust Collector (2-13-16) Revision, Purchase of Fibermark Facility – Permitting of 900 hp Boiler, and Addition of Insignificant Activities.

2. Type(s) of emission control and efficiency:

(see combined Title V / PSD permit for details of emission points associated with each process group described below)

Group 1 - Combustion Sources - no emissions control.

Group 2 - Raw Material Handling, Mixing Systems, and Recycle Operations.

PM controls include filters, dust collectors, baghouses, and cyclones with efficiencies of 98%.

Group 3 - Five Extruders and Smog Hogs with PM control efficiency of 95.6%.

Groups 4, 5, 6, and 7 - Extractor Lines I, II, III, and IV with VOC control efficiency of 96%, 96%, 98%, and 98%, respectively.

Group 8 - Seventeen aboveground storage tanks, with VOC control efficiency of 96%.

Group 9 - Eleven aboveground storage tanks, with VOC control efficiency of 98%.

Group 10 - Fourteen aboveground storage tanks, with VOC control efficiency of 98%.

See BACT discussion for details of VOC and HAP control for Extractor Line III

3. Emission factors and their source:

VOC emissions are mainly fugitives generated from processing, storing, and using solvent on the extractor lines, also from boilers burning natural gas. Emissions of VOC from combustion are based on AP-42 factors. Emissions of VOC from solvent use are assumed to be 100% of VOC purchased and consumed in the process. VOC emissions are released from several point source stacks associated with Carbon Beds (1-3) control and solvent recovery operations, and from the three coating operations on Extractor Lines II, III, and IV.

Potential VOC emissions exceed 250 tons per year (based on maximum potential emissions after control, and based on 8760 hours per year). The VOC fugitives were included in the calculation of potential to emit (PTE) in the facility's PSD and Title V permit applications.

The amounts of VOC (100% of solvent) and n-Hexane (65% of the new solvent) emissions are determined from the monthly usage records of the solvent for the extractor lines, and from the solvent purchase documents.

The emission allocation of solvent to each extractor line is described in the facility's 2004 PSD application for Extractor Line III and is presented below for reference:

- | | |
|---|-----|
| • Allocation percent of purchased solvent to Extractor Line I | 16% |
| • Allocation percent of purchased solvent to Extractor Line II | 34% |
| • Allocation percent of purchased solvent to Extractor Line III | 26% |
| • Allocation percent of purchased solvent to Extractor Line IV | 24% |

Daramic is required to monitor the emission parameters listed in its VOC/n-Hexane monitoring plan that was submitted to the Division. Daramic is required to keep a copy of the plan available at the plant site for inspection by the Division.

Particulate emissions are generated from mixing operations, solid material unloading operations, extruding operations, and from combustion processes. The PM emission factors from

combustion processes use the AP-42 factors while the PM emissions from mixing and material processes use calculated estimates based on control device efficiency as presented in the facility's PSD application and in the revised Title V application from June 2004. The PM emission potential from point sources is less than 250 tons per year (based on maximum potential emissions after control, and based on 8760 hours per year).

Potential emissions of other criteria pollutants (nitrogen oxides, carbon monoxide, sulfur dioxide) were below 100 tons per year (based on maximum potential emissions after control, and based on 8760 hours per year).

4. Applicable Regulations:

401 KAR 51:017, (40 CFR 5.21), *Prevention of Significant Deterioration of Air Quality*, is applicable to Extractor Line III since Daramic was found to be in violation of the synthetic minor limit on VOCs set on Extractor Line III.

401 KAR 59:010, *New process operations*, is applicable to an emissions unit commenced on or after July 2, 1975.

401 KAR 59:015, *New indirect heat exchangers*, applies to an emissions unit with a capacity of less than 250 mmBtu/hr which commenced on or after April 9, 1972.

401 KAR 61:020, *Existing process operations*, is applicable to an emissions unit commenced before July 2, 1975.

401 KAR 61:015, *Existing indirect heat exchangers*, applies to the boilers ED 01, ED 02, and ED 03 with a total rated capacity of $26.8 + 22.3 + 63.0 = 112.1$ mmBtu/hr heat capacity that were constructed before April 9, 1972.

401 KAR 63:010, *fugitive emissions*, is applicable to Extractor Lines #1 - #4.

401 KAR 63:020, *Potentially hazardous matter or toxic substances*, is applicable to all hazardous or toxic air pollutants.

401 KAR 63:021, *Existing sources emitting toxic air pollutants*, is applicable to n-hexane emissions.

40 CFR 60 Subpart Kb, *Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984*, is applicable to storage tanks exceeding 19,812.9 gallons (or 75 m^3).

40 CFR 63 Subpart EEEE, *National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)*, is applicable to Group 12. [future compliance date of February 5, 2007]

40 CFR 63 Subpart DDDDD, *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters*. The four existing

boilers must be in compliance with this Subpart DDDDD no later than September 13, 2007.

40 CFR 64, *Compliance Assurance Monitoring*, is applicable to the control of hexane and VOC emissions from extractor lines with the use of carbon bed filters.

EMISSION AND OPERATING CAPS DESCRIPTION:

Dispersion modeling (ISCST3 air model) for the Title V permit application has been performed for the solvent containing 65% n-Hexane, which showed its emissions comply with 401 KAR 63:020 requirements.

PERIODIC MONITORING:

40 CFR 64, Compliance Assurance Monitoring, applies to the control of hexane and VOC from Group 04 Extractor Line I, Group 05 Extractor Line II, Group 06 Extractor Line III, and Group 07 Extractor Line IV, with the use of carbon bed filters. All parameters listed in the VOC monitoring plan for the facility shall be monitored and recorded.

Indicator Ranges, Designated Conditions, Performance Design Criteria and Performance Criteria

Carbon bed exhaust shall be continuously monitored by use of analyzers that measure the concentration of combustible vapors in the outlet air stream. The operator shall observe the concentration during each shift. Normal operating conditions shall have a common exhaust concentration of hexane less than 100 ppm. Should an analyzer fail or malfunction, refer to Section F, 7 and 8 of the permit. If a carbon bed is shut down for any reason (preventative maintenance, malfunction, etc.), then the extractors and evaporators that feed the carbon bed shall be shut down.

In addition to the continuous monitoring of the carbon bed exhaust by the equipment operators, a daily emission check and routine inspection of the carbon bed, extractor and equipment shall be performed. Carbon bed analyzers shall be calibrated monthly and records shall be available.

OPERATIONAL FLEXIBILITY:

None

TITLE V AND PSD REVIEW:

1. PSD and Title V Applicability:

Daramic's facility (SIC 3081, Plastic Battery Separator Manufacturing) does not fall under one of the 28 listed major source categories listed under PSD regulations. The facility is located in a county classified as attainment or unclassifiable pursuant to Regulation 401 KAR 51:010.

The facility is currently a PSD major source of VOC (a criteria pollutant), with a potential to emit VOC from point and fugitive sources.

Daramic was found to be in violation of the synthetic minor limit on VOCs set on Extractor Line III. The synthetic minor limit was set at the time of construction of Line III. To resolve the

notice of violation issued by the Division, Daramic entered into an agreed order with the Division that required submittal of a PSD application for Extractor Line III. The PSD review of Extractor Line III was not the result of new construction, modification, or reconstruction. Daramic prepared and submitted the Title V PSD permit application for Line III in February 2004. The PSD review is discussed in this Statement of Basis.

Under the PSD application for Extractor Line III, Daramic presented a best available control technology (BACT) demonstration for VOC emissions from Extractor Line III and VOC emissions from coating operations on Line III.

The PSD review for Daramic involves the following six requirements:

- a. Demonstration of the application of Best Available Control Technology (BACT).
- b. Demonstration of compliance with each applicable emission limitation under 401 KAR Chapters 50 to 63 and each applicable emission standard and standard of performance under 40 CFR 60 and 61.
- c. Air quality impact analysis.
- d. Class I area(s) impact analysis.
- e. Projected growth analysis.
- f. Analysis of the effects on soils, vegetation, and visibility.

2. Title V and PSD Permit Emissions by Pollutant Category:

The table below lists the potential emissions after control for all Title V and PSD regulated pollutants in tons per year:

Pollutant		PSD – Plant Emissions Extractor Line III (tons per year)	Title V – Facility Emissions All Other Processes (tons per year)	Combined PSD – Title V Facility Emissions (tons per year)
Criteria Pollutants				
SO ₂ (Note 1)		NA	0.30	0.39
NO _x (Note 1)		NA	65.66	65.66
CO (Note 1)		NA	55.18	55.18
VOC (Notes 2- 5)		215.37	621.20	836.57
PM ₁₀		NA	192.91	192.91
HAP	n-Hexane	137.09 (Note 3)	393.20	530.29
Total Plant Hexane Emissions				121 pounds per hour (Note 4&5)

Potential Emission Assumptions: -

- The annual emissions presented in this table were calculated based on maximum hourly emission rates after controls times 8,760 hours per year.
- Note 1 – SO₂, NO_x, and CO emissions are the result of combustion from the three boilers.
- Note 2 – VOC is calculated based upon 26% allocation of Solvent to Extractor Line III, including fugitive emissions from equipment leaks that are not controlled by the carbon beds (210.9 tons per year) plus the VOC emissions from the coating process on line III (4.45 tons per year).
- Note 3 – n-Hexane (a hazardous air pollutant) was calculated based on 26% allocation to Extractor Line III from the facility's Title V PSD permit application and the percentage of n-Hexane in the solvent (i.e. 65%).
- Note 4 – VOC Calculations for the purpose of this combined Title V and PSD permit were based on 100% VOC content of the solvent purchased and used in the plant processes.
- Note 5 – VOC and hexane emissions includes fugitive emissions from equipment leaks that are not controlled by the carbon beds.

Line III of the facility is subject to a PSD review for VOC only.

3. BACT Review:

Pursuant to 401 KAR 51:017, Section 8 (1) and (3), a major stationary source subject to a PSD review shall meet the following requirements:

- i. The proposed source shall apply BACT for each pollutant that it will have the potential to emit in significant amounts.
- ii. The proposed source shall meet each applicable emissions limitation under 401 KAR Chapters 50 to 63, and each applicable emission standard and standard of performance under 40 CFR 60 and 61.

In the permit application Daramic presented a demonstration of the best available control technology for VOC at each affected facility for Extractor Line III. The affected facilities for Extractor Line III include the process line, solvent containing storage tanks, and surface coating operation.

The Division has reviewed the proposed control technology in conjunction with information available in U.S. EPA's RACT/BACT/LAER Clearinghouse and the BACT/LAER Information System (BLIS) database. A summary of the proposed control technology is presented below.

Stack ID	Affected Facility	Pollutant	Capture Technology (Efficiency)	Control Technology	Control Level	Controlled Emission (pounds/hr)	Controlled Emission (tons/year)
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Stack ID	Affected Facility	Pollutant	Capture Technology (Efficiency)	Control Technology	Control Level	Controlled Emission (pounds/hr)	Controlled Emission (tons/year)
37	Storage Tank VOC Emissions	VOC	Vents to Carbon Bed 2 (100%)	Carbon Bed & Recycle	98%	48.15	210.9
	Extractor Line III	VOC	Duct to Carbon Bed 2 (100%)				
38, 39, 40	Coating Line III	VOC	None	0.5 pound VOC per Gallon Coating	--	1.02	4.45

Note: There are no other applicable VOC emissions limitations under 401 KAR Chapters 50 to 65, or under 40 CFR Parts 60, 61 and 63 for the affected facilities listed above.

Extractor Line III consists of condensers, infeed Hood, Extractor Body, Stripper, UEL Drying Oven, LEL Tunnel, Exit Hood, piping, pumps, seals, Web Path & Winder, Coater, Coater Tunnel, Coating Dryer, and Surfactant (ARMA) tanks. All these processes except coating apply controls to reduce air emissions. The BACT for VOC for each of the process is discussed below:

A. BACT for Extractor Line III:

The VOC emissions from Extractor Line III process equipment occur at the extractor, at coating, and at the solvent transfer lines and storage tanks. During the extraction process, oil, introduced into the mixture prior to the extruder process, is removed or extracted with the solvent.

This oil solvent mixture is returned to an evaporation process that separates the oil and solvent for reuse. VOC vapors from this evaporator, along with VOC vapor from the extractor body and solvent storage tanks, are ducted to a carbon bed absorption system. Steam is used to remove the solvent captured in the carbon bed and the resulting solvent-laden vapors are condensed and returned to the solvent tank for reuse in the process.

Daramic considered the following technologies for control of VOC vapors from the extraction line and storage tanks:

- Option 1 - Thermal oxidation
- Option 2 - Catalytic oxidation
- Option 3 - Carbon adsorption

In the PSD application Daramic reviewed and presented analysis of control systems used in lead acid battery separator operations both in the United States and around the world. The primary control in all cases was carbon bed adsorption for VOC recovery. The manufacturing operations reviewed are presented in the following chart:

Lead Acid Battery Separator Plants

Company	Location	Control System Used
1. Daramic, LLC	Owensboro, Kentucky, USA	Carbon Bed System
2. Daramic, LLC	Corydon, Indiana, USA	Carbon Bed System
3. Daramic, LLC	Selestat, France	Carbon Bed System
4. Daramic, LLC	Potenza, Italy	Carbon Bed System
5. Daramic, LLC	Prachin Buri, Thailand	Carbon Bed System
6. ENTEK	Lebanon, Oregon, USA	Carbon Bed System
7. Amerace	Piney Flats, Tennessee, USA	Carbon Bed System
8. Jungfer (Daramic, LLC)	Feistritz, Austria	Carbon Bed System
9. Global + Yuasa	Korea	Carbon Bed System
10. Baotou	China	Carbon Bed System
11. Korendo	Indonesia	Carbon Bed System
12. Ampei	China	Carbon Bed System
13. Meixin	China	Carbon Bed System

Daramic proposed to use Option 3, carbon bed adsorption with VOC recovery, for control of VOC on Extractor Line III processes that use the hexane based solvent. For the Extractor Line III solvent use processes, the Division agrees with the Option 3 proposal, since options 1 and 2 would increase net air emissions from this process and create a non-recoverable process cost due to the one time through solvent use.

Based on current stack data, controls on Extractor Line III currently capture and return over 250 pounds of VOC per hour (or 1095 tons/year) to the process line. Options 1 and 2 for the Extractor Line III would result in significant increase in operating costs to Daramic based on the need to purchase fresh solvent to replace the solvent destroyed by either thermal or catalytic incinerators. Options 1 and 2 result in a cost of \$1,122 and \$960 per ton of 1% VOC lost plus 99% destroyed for the thermal and catalytic incinerator, respectively. Option 3 (to use existing carbon bed with an increase of its efficiency to 98% capturing/recycling of VOC) results in a system effectiveness value of \$386 per ton of 2% VOC lost plus 98% recycled.

Three options result in a VOC emission reduction of 1,073 tpy for options 1, 2, and 3. The annualized costs for these three options were \$1.2, \$1.0, and \$0.4 million, respectively. The annualized costs take into account equipment costs, operating costs, and solvent replacement costs only (without consideration of net air emissions increase by options 1 or 2).

The following table lists the control technologies that were reviewed and presents

advantages and disadvantages of each technology:

Control Technology	Determination
Catalytic Oxidizer	Typical Control Efficiency: 99% Technology Could be Used , but the disadvantage is its high cost for 1% more efficiency that Daramic would be required to scrap the current Carbon Bed adsorption system, install the new system, and purchase replacement solvent for the solvent destroyed and not recycled using this approach. This option results in a higher fuel use than carbon beds and lower fuel use than Thermal Oxidizers.
Thermal Oxidizer	Typical Control Efficiency: 99% Technology Could be Used , but the disadvantage is its high cost for 1% more efficiency that Daramic would be required to scrap the current Carbon Bed adsorption system, install the new system, and purchase replacement solvent for the solvent destroyed and not recycled using this approach. This control technology will result in higher fuel usage versus the other two options.
Carbon Bed Adsorption	Typical Control Efficiency: 98% Selected BACT ; Best suited for the low solvent laden air concentrations and high air flow rates; for similar sources, the LAER/BACT has typically been the Carbon Bed Adsorption.

Daramic has proposed to use carbon bed adsorption with control efficiency of 98% as the BACT for the VOC control.

The Division has reviewed the EPA's BACT/RACT/LAER Clearinghouse and found that, for similar sources with VOC emissions, the BACT/LAER has typically been hoods or enclosures over the entrance and exit of the extractor bodies, 100% capture of vapors from solvent storage and process tanks vents, and carbon bed adsorption for VOC control and solvent recycle.

The Division agrees with this proposal after reviewing the BACT/RACT/LAER Clearinghouse, the capture equipment costs, and the control alternatives submitted by Daramic. BACT for VOC for Extractor Line III is 98% control, 100% storage tank vent capture, and use of carbon bed adsorption.

B. BACT for Extractor Line III Coating:

The coating operating applies a surfactant to the plastic battery separator sheet to assist the further processing of this material in the slitting and cutting operations. The raw material is Aerosol MA 80-I Surfactant (ARMA) and contains 5.0% isopropanol (VOC). The ARMA is then diluted using water to obtain percent solids necessary for the coating of the profile being run. The average mixture contains 124 gallons of ARMA and 476 gallons water of water, thus reducing the overall isopropanol (VOC) concentration to 1.13%. The loss of isopropanol (VOC) does not occur until it reaches the Coating Dryer.

Based on a review of the RBLC, coating operations that require controls fall into two categories. The first are coating operations that individually emit large quantities of VOC per year (over 100 tons per year per source). The second category of coating VOC sources that require control are those that are currently subject to a MACT standard or other process standard: i.e., printing, painting, metal coating, etc. The RBLC indicates that there are a number of surface coating operations where BACT has been demonstrated to be a VOC limit of 0.5 pounds per gallon. The facility therefore recommends that BACT for the coating operation be a process limit of 0.5 pounds of VOC per gallon of coating.

The Division agrees with Daramic's analysis. The BACT for this coating operation will be the requirement of limiting the content of VOC to 0.5 pound per gallon of coating.

4. Air Quality Impact Analyses:

Pursuant to 401 KAR 51:017, Section 11, an application for a PSD permit shall contain an analysis of ambient air quality impacts in the area that the proposed facility will affect for each pollutant that it will have the potential to emit in significant amounts as defined in 401 KAR 51:001, Section 1. The purpose of this analysis shall be to demonstrate that allowable emissions from the proposed source will not cause or contribute to air pollution in violation of: (i) a national ambient air quality standard in an air quality control region; or (ii) an applicable maximum allowable increase over the baseline concentration in an area.

With respect to a pollutant for which no ambient air quality standard exists, the analysis shall contain the air quality monitoring data the Division determines necessary to assess ambient air quality for that pollutant in an area that the emissions of that pollutant will affect. For pollutants (other than nonmethane hydrocarbons) for which a standard does exist, the analysis shall contain continuous air quality monitoring data gathered to determine if emissions of that pollutant will cause or contribute to a violation of the standard or a maximum allowable increase.

As previously discussed, the facility prepared the PSD application because of an exceedance of an emission limitation on Extractor Line III that was accepted to avoid the applicability of PSD review in 1995. The source was only required to conduct an air quality impact analysis for VOC (for ozone).

However, there is no air quality standard for VOC emissions. With respect to a pollutant for which no ambient air quality standard exists, the analysis shall contain the air quality monitoring data that the Division determines necessary to assess ambient air quality for that pollutant in an area that the emissions of that pollutant will affect. VOC is a precursor for ozone, and when released into the atmosphere can remain long enough in the atmosphere to participate in photochemical reactions and will cause ozone depletion. The ozone monitoring data will be reviewed to assess the ambient air quality in the area.

Note on New Ambient Air Quality Standards:

Effective September 16, 1997, U.S. EPA promulgated new and revised ambient air quality standards for ozone and particulate matter. These have been summarized in the table below:

Pollutant	Existing Standard	New Standard
Ozone (O ₃)	0.12 ppm (1-hour average)	0.08 ppm (8-hour average)
PM _{2.5}	None	15 µg/m ³ (annual average)
	None	65 µg/m ³ (24-hour average)
PM ₁₀	50 µg/m ³ (annual average)	50 µg/m ³ (annual average)
	150 µg/m ³ (24-hour average)	150 µg/m ³ (24-hour average)

On April 15, 2004 EPA designated as "nonattainment" areas throughout the country that exceeded the health-based standards for 8-hour ozone. Final rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard - Phase I was also published on April 15, 2004. U.S. EPA is yet to publish the Phase II implementation guidance. Daviess County has monitored 8 -hr ozone ambient concentration of 0.073 ppm (3 year average). This value is less than 85 parts per billion (0.085ppm) and does not exceed the level of the 8-hour standard. There is no problem anticipated from this project on the 8-hr ozone standard.

a. Modeling:

Dispersion modeling is generally not feasible for the PSD air quality impact analysis for ozone. The Division is going to rely upon ambient ozone monitoring data to determine whether any air quality problems exist in the area of the proposed new or modified PSD source. In the event that ambient ozone data indicates violations of the 1-hour ozone standard, then the source must mitigate its ambient impact so as not to cause or contribute to the violations. As discussed above there are no violations found of 8-hr standard.

b. NAAQS:

As specified in 401 KAR 51:017, Prevention of Significant Deterioration of Air Quality, no concentration of a regulated pollutant shall exceed either its secondary or primary ambient air quality standards for that pollutant. The Division has used the monitoring data from the air monitoring station for Daviess County located at US 60 and Pleasant Valley, Owensboro, (station number 21-059-0006) to identify the status of ozone for the Daramic PSD.

The National Ambient Air Quality Standards (NAAQS) for ozone are as follows:

Primary NAAQS:	1-Hour (1 per year/3 years)	0.12 PPM
	8-hour (3 year avg. of 4 th max.)	0.08 PPM
Secondary NAAQS:	Same as Primary Standard	

Daviess County station (21-059-0006) data for 2003 Number of observation 5858

- 1-hour Average data – Number of observations exceeding standard of 0.12 = 0, 1st high - 0.09 PPM, 2nd high - 0.086 PPM
- 8-hour average data – Number of observations exceeding standard of 0.084 = 0,

1st high - 0.076 PPM, 2nd high - 0.071 PPM, 3rd high - 0.071 PPM, 4th high - 0.069 PPM, and Average - 0.072 PPM

The following table summarizes the ozone monitor station data for the last five years, Daviess County Station Number 21-059-0006 (Source USEPA AirData – Monitor Values Report Oct 1, 2004):

Monitor Year	NAAQS 1-Hour Average PPM	Recorded 1 st High 1-Hour Max PPM	NAAQS 8-Hour Average PPM	Recorded 4 th High 8-Hour Max PPM
2004	0.12	0.071	0.08	0.061
2003	0.12	0.090	0.08	0.069
2002	0.12	0.114	0.08	0.086
2001	0.12	0.108	0.08	0.073
2000	0.12	0.085	0.08	0.074

There were no violations recorded of the 1-hour NAAQS for ozone at the Daviess County monitor in the period of 2000 to August 2004. There was one violation recorded in the period of review for the 4th high 8-hour maximum during 2002.

According to Appendix H of 40 CFR 50 and Appendix A of 40 CFR 53, the standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (235 ug/m3) is equal to or less than one (1), as determined by Appendix H of 40 CFR 50. Since there have been no exceedances recorded at the Daviess County monitor, the NAAQS is being met.

5. Class I Area Impacts:

The nearest Class I area is Mammoth Cave National Park, located over 60 miles southeast from the Daramic site in Owensboro, Kentucky.

Daramic has not submitted its PSD application to the National Park Service (NPS) for their review due to the distance and the fact that the prevailing wind for Daviess County is approximately 80% from the quadrant from south to west (compass direction 180 degrees to 270 degrees). This is based on wind direction data from the Louisville station (no. 93821). The data shows that the percentage of the wind blowing towards Mammoth Cave National Park from the Daramic site in Daviess County is about 15-17%. Due to the dominant wind direction, the distance from Mammoth Cave, and the fact that the NAAQS for Daviess County has been met for the last five years, Daramic does not believe that operations at this facility at the levels of VOC emissions identified in their permit will have an impact on the nearest Class I area.

The Division agrees with Daramic's assessment of their potential impact on Mammoth Cave

National Park (a Class I area) and further agrees that Daramic did not need to submit the PSD application to the NPS for review.

The Division also has analyzed the following, as they are the other items of concern:

Regional Haze: Chemical reactions of air pollutants and weather conditions can create fine particles, which can remain in the air for several days and be transported great distances. As a result, fine particles transported from urban and industrial areas may contribute significantly to impaired visibility in places, such as national parks, valued for their scenic views and recreational opportunities. In the eastern U.S., sulfates from power plants and other large industrial sources play a major role. Daramic does not emit any particulate matter at their Owensboro facility that is subject to PSD review. Therefore, no review for impact on the visibility (as Haze) in the Class I area (Mammoth Cave) was needed.

Photochemical Smog: Ground-level ozone is an air pollutant that damages human health, vegetation, and many common materials. It is a key ingredient of urban smog. Ground-level ozone is not emitted directly into the air, but rather is formed by gases called oxides of nitrogen (NO_x) and VOC that, in the presence of heat and sunlight, react to form ozone. Ground-level ozone forms readily in the atmosphere, usually during hot weather. As a result, it is known as a “summer-time” air pollutant.

In a recent PSD permit, the Division has communicated with the NPS on the photochemical smog issue. The NPS has monitored the VOC emissions (considered as to biogenic or anthropogenic) and NO_x emissions to study the “smog” issue. The NPS has determined that about half of anthropogenic emissions are found to be from mobile sources, even though Mammoth Cave National Park is about 90 miles northeast of Nashville and 90 miles southwest of Louisville.

It is Daramic’s contention (and the Division agrees), that VOC emissions generated by Daramic, (60 miles to the northwest of Mammoth Cave National Park) would form ozone but it would be unlikely that this ozone would be transported to Mammoth Cave National Park. This statement is based on the fact that the Daviess County 1-hour and 8-hour (4th high) ozone readings have been in compliance with NAAQS for the last three years.

6. Modeling Results – Kentucky Significant Harm Regulations:

Daramic has conducted air modeling using the U.S. EPA ISCST3 for all point and area sources of n-hexane (a hazardous air pollutant) emissions at the Owensboro facility. The air model indicated that the offsite air impact of 121 pounds per hour n-hexane emissions for the model years ranged from an annual average of 116.9 micrograms per cubic meter (ug/M^3) in 1988 to 192.9 ug/M^3 in 1990. The U.S. EPA Region IX Preliminary Remediation Goals (PRG) level for air impact is 210 ug/M^3 . The facility’s proposed n-hexane emissions at 121 pounds per hour comply with the air toxic pollutant regulations for significant harm under 401 KAR 63:020, Potentially hazardous matter or toxic substances.

7. Additional Impact Analyses:

a. *Construction and related emissions* - Daramic did not address new construction as part of the

PSD application.

- b. *Growth Analysis* - Daramic did not address growth analysis as part of the PSD because no new growth is anticipated from the PSD application.
- c. *Soils and Vegetation Impacts Analysis* - Ground-level ozone is an air pollutant that damages human health, vegetation, and many common materials. See the discussion on Regional Haze and Photochemical Smog above in the Class I Area Impact analysis.
- d. *Visibility Impairment Analysis* - See the discussion on Regional Haze and Photochemical Smog above in the Class I Area Impact analysis.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has only adopted the provisions of 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12 into its air quality regulations.